
DENTAL HEALTH FACT SHEET

FLUOROSIS OF TEETH

The widespread use of fluorides in various forms (water, milk, salt, dentifrices, gels, rinses, tablets, drops, etc.) is in large part responsible for the significant declines in tooth decay. It is important for children to receive appropriate levels of dietary and topical fluorides for the prevention of dental decay. However, excessive levels of dietary fluoride result in an increased risk of dental fluorosis that can be an esthetic problem.

DEFINITION AND CLINICAL FEATURES OF DENTAL FLUOROSIS

Dental fluorosis is a hypoplasia or hypomineralization of the dental enamel caused by the consumption of excessive amounts of fluoride during the years of tooth calcification. Long-term intake of fluoride during enamel formation results in a continuum of clinical changes of the enamel varying from fine white lines in the enamel to severely chalky, opaque enamel which breaks apart soon after tooth eruption. The severity of changes depends on the amount of fluoride ingested during the long-lasting period of tooth formation.

The first signs of dental fluorosis appear as thin white striae across the enamel surface. In slightly more affected teeth, the fine white lines become broader and more pronounced. Occasional merging of several lines occurs to produce smaller irregular, cloudy or paper-white areas scattered over the surface. With increasing severity, the entire tooth surface exhibits distinct, irregular, opaque, or cloudy white areas. The next degree of severity manifests in irregular opaque areas, which merge until the entire tooth surface appears chalky white. Yet more severe stages exhibit a tooth surface which is entirely opaque with focal loss of the outermost enamel. Such small enamel defects are usually designated "pits". With increasing severity these pits merge to form horizontal bands. Ultimately, the most severely fluorotic teeth exhibit an almost total loss of surface enamel whereby the normal morphology is severely affected. The remaining part of the tooth often exhibits a dark brownish discoloration. The discoloration is entirely dependent on post-eruptive environmental conditions such as dietary habits.

RISK FACTORS ASSOCIATED WITH DENTAL FLUOROSIS

Dental fluorosis is associated with ingested fluoride during the tooth forming years. The most important risk factor in determining whether dental fluorosis will occur and how severe it will be, is the total amount of fluoride consumed from all sources during the period of tooth calcification. The risk period may extend to age 6 or 7. Sources of fluoride include a) water-related sources such as drinking water, reconstituted infant formula, and soft drinks and b) fluoride containing dental products such as dietary fluoride supplements, toothpaste, mouthrinses, and gels.

The prevalence and severity of fluorosis has been shown to increase when the concentration of fluoride in the drinking water is above 2.0 mg (2.0 ppm) of fluoride per liter. The recommended concentration for public water systems in Wisconsin is 1.1 mg of fluoride per liter. It has been reported that some physicians and dentists may prescribe dietary fluoride supplements inappropriately, since they prescribe the supplements without first determining the water fluoride content. Fluoride containing dentifrice, or toothpaste, has also been implicated as a risk factor contributing to the development of dental fluorosis. The risk is attributed to young children (prior to age 5 or 6) swallowing rather than expectorating fluoride-containing dentifrice.

TRENDS IN PREVALENCE OF DENTAL FLUOROSIS

Overall, dental fluorosis remains more prevalent in fluoridated than non-fluoridated areas. Dental fluorosis appears to have increased in both non-fluoridated and fluoridated communities, but has increased much more in non-fluoridated or low-fluoride areas. In low-fluoride areas the total prevalence of dental fluorosis has increased from the early 1940's to the mid-1980's from less than 1% to approximately 6%. In optimally fluoridated communities the total prevalence of dental fluorosis apparently has increased from approximately 13% to 22%. It should be emphasized that this increase has been limited almost entirely to the milder forms of dental fluorosis.

PREVENTION OF DENTAL FLUOROSIS

Prudent public health practice dictates using no more fluoride than the amount necessary to achieve the desired effect of tooth decay prevention. The public should avoid excessive and inappropriate fluoride exposure. Recommendations for prevention include:

- ◆ Health professionals and the public should be informed about the fluoride concentration of their communities' drinking water.
- ◆ A patients' home source of drinking water should be determined. If bottled water or well water is consumed, the fluoride levels need to be documented. If the fluoride level in the water is greater than 2.0 mg/l, alternative sources of water should be recommended for children younger than age 8.
- ◆ If the fluoride level in the home water supply is known to be deficient (less than 0.7 mg/l), then fluoride dietary supplements should be prescribed for children through adolescence, in accordance with the dosage schedule of the American Dental Association and the American Academy of Pediatrics. The dosage varies according to the age of the child and the concentration of fluoride in the drinking water.
- ◆ Commercially prepared infant formulas are made with water that contains negligible amounts of fluoride. If infant formulas are mixed with fluoridated water from the home supply, then no fluoride supplementation is needed; whereas, if infant formulas are mixed with water that contains less than 0.3 mg/l of fluoride, the fluoride supplement schedule should be followed.
- ◆ Parents should be encouraged to teach children who are younger than 6 years to minimize swallowing of toothpaste and to use only a pea-sized amount on the brush.
- ◆ Dental professionals who apply fluoride treatment gels or solutions should be judicious in the amount used and should apply suction to minimize swallowing of gels.

For additional information contact:

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References:

1. Public Health Service. Department of Health and Human Services. Review of fluoride benefits and risks. February 1991.
2. Ekstrand J, Fejerskov O, and Silverstone L. Fluoride in dentistry. Copenhagen: Munksgaard, 1988.
3. Mason J. A message to health professionals about fluorosis. JAMA 1991, Vol 266, No 22.